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Air Cooling Through Vehicle Suspension System

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***Abstract*: Air cooling impact through Vehicle Suspension system shows the effective use of suspension of car for air conditioning and different applications. The vehicle suspension generates mechanical energy that having 2 sorts, potential energy and kinetic energy. From this potential energy is kept by damper and kinetic energy is usually wasted. This kinetic energy is employed for varied purpose. From that, in this paper compressed air is created by using pneumatic cylinder with swing type check valve arrangement. The main objective of the system is to style a cooling system freelance of the Chlorofluorocarbons and Hydro fluorocarbons. This output compressed air from pneumatic cylinder is employed for air cooling impact within the cupboard or cabinet of the vehicle. The main aim of our project is to Design and Develop Air Cooling impact through Vehicle Suspension. The Three Dimensional (3D) model is drawn. All the elements are factory-made and so assembled along and so the testing of model is dole out.**

***Keywords*: Vehicle Suspension, Air Conditioning, Peltier Impact.**

1. Introduction

The learning of air conditioning is that branch of subject that deals with the study of conditioning of air i.e. activity and maintaining fascinating internal region acquisition for human comfort, regardless of external conditions. This subject in its broad sense conjointly deals with the acquisition of air for automobile purpose. The vehicle runs on the assorted road conditions. The frame of the vehicle and body is mounted on front shaft and rear shaft with shock absorbers and is derived. The road shocks transmitted to the frame of car creates discomfort to the travelers of the automobile vehicle. In beneath dangerous road conditions the traveler's experiences bounce and roll at the cornering and pitching of automobile vehicle. For getting human comfort and improve internal atmosphere within the cupboard with freshness of air and air con impact within the automobile vehicle. In India, the road conditions are dangerous in village and town conjointly. So, the air-cooling impact by using suspension has work expeditiously.

Compressed air could be a gas, or a mixture of gases, that has been anesthetizing larger pressure than the air within the general setting. Current applications mistreatment compressed gas is various, together with jackhammers, tire pumps, air rifles, and aerosol cheese. In line with proponents, compressed gas conjointly contains a whole lot of potential as a clean, cheap, and infinitely renewable energy supply. Its use is presently being explored as another to fossil fuels. Pneumatic energy is that energy which is offered without delay and low value or low cost energy. Non-conventional energy system is incredibly essential at this point to the planet. So, during this project compressed air was created with the assistance of vehicle suspension. Then this compressed air is employed to work the vehicle. Compressed air production mistreatment vehicle suspension doesn't need any input power to supply compressed air.

The suspension systems are employed in vehicle to support weight of car body and to isolate the vehicle chassis from road disturbances. The dampers are designed to dissipate vibration energy into heat therefore on cut back the vibration transmitted from road excitation. It's possible to reap this vibration energy from the vehicle suspension to enhance the potency of the vehicle. The suspension used for the regeneration of vibration energy is termed regenerative suspension. One among the necessary losses is that the energy dissipation from the vibration of suspension.

Generally, all the four wheelers are equipped with air conditioning system. The air conditioning system uses refrigerant that produces virulent gases like oxide that affects the engine performance and conjointly causes gas depletion. So, we've done more modifications by using Peltier module for cooling the compressed air which is obtained by pneumatic cylinder. This technique is applicable for all the four wheelers as suspension works whereas turning, waviness of road, whereas applying brakes, speed breakers, on tract roads etc. Applicable altogether vehicles. For cleansing & inflation of tubes Swing machine compress air will use for pneumatic braking system.

The function of car suspension is to support the load of the vehicle body, to isolate the vehicle chassis kind road disturbances, to alter the wheels to carry the paved surface. Two

main components in suspension systems are spring and damper. The damper is intended to dissipate vibration energy into the warmth to attenuate the vibration that is transmitted from road excitation. However, the dissipated heat is from fuel or electric power. In hybrid vehicle recapture a number of the energy typically lost in braking system however the dissipation of vibration energy by shock absorbers within the vehicle suspension remains untapped. Within the past, we have a tendency to pay very little attention to energy loss of car suspension. However, what proportion energy dissipated by the damper of car suspension? In line with reference, solely 10-20% the fuel energy is employed for vehicle quality. The linear motion of suspension is additionally use for compress the air by mistreatment piston cylinder arrangement. By mistreatment this compress air we will run A.C. system within the automobile and save fuel. "Energy in motion once it's suddenly applied with a form of obstacle suggests that in line with Newton's law for each action there's associate equal and opposite reaction. Utilization of this reaction is that the basic reason behind the choice of this project work."

2. Literature Review

1. Compressed Air Generation Using Vehicle Suspension System by S. Shelke, P. Gore, G. Jadhav, A. Doiphode, S. Tekwade.

This includes however the compressed air is made by victimization vehicle suspension. We all know Pneumatic energy is that the promptly accessible and low value energy. Now-a-days Non-conventional energy system is extremely essential to the planet. Therefore, here we tend to square measure specializing in gas style of energy for this project. In this project compressed air are often made with the assistance of car mechanical system. Then this compressed air is employed to control the vehicle. Compressed air production victimization mechanical system doesn't need any fuel for its motion. This air operated vehicles square measure the new innovative idea to run vehicle by using the compressed air. Therefore, during this paper, we tend to square measure creating one style of device that's used for manufacturing compressed gas for various functions by using vehicle suspension. The compressed air is also used for running the vehicle and for air con functions. Here we tend to begin with Associate in nursing introduction to pneumatic; its numerous applications and units and in short explain a number of devices capable of utilizing air effectively and their relative deserves. The pneumatic operated vehicle is extremely helpful to avoid wasting the standard style of fuel and once few years these items can play an awfully vital role. Pneumatic energy is that the promptly accessible and low value energy. Non-conventional energy system is extremely essential at now to our nation. In order that the pneumatic type of energy is taken into account for our project. In this project compressed air are often made with the assistance of motion of wheel. Then this compressed air is often used for additional applications.

As we all know that pneumatic energy is that the promptly accessible and low-priced energy. Non-conventional energy system is extremely essential at now to the planet. Therefore, during this project compressed air was made with the assistance of car suspension. Then this compressed air is employed to control the vehicle. Compressed air production using vehicle suspension doesn't need any input power to provide compressed air. This air operated vehicles square measure the new innovative idea to run vehicle by using the compressed air system.

2. Air Cooling Effect through Vehicle Suspension System by Saiyyed Kamran, Maniyar Moij, Shaikh Shahebaz, Shaikh Md. Aves, Khandare R. S., Ganore D. J.

The paper presents Air Cooling effect through Vehicle Suspension System are shows the effective use of suspension system of vehicle for air conditioning and other applications. The vehicle suspension generates mechanical energy which having two types potential energy and kinetic energy. From this potential energy is stored by shock absorber and kinetic energy is generally wasted. This kinetic energy is used for various purpose. From that in this paper compressed air is produced by using pneumatic cylinder with swing type check valve arrangement. This output compressed air from pneumatic cylinder is used for air cooling effect in the cabinet of the automobile vehicle. Also, increase the mileage of vehicle and reduce the NOx nearly about 80% and CO by 70%. In this system, we will use suspension system, heat exchanger, pressure gauge and thermometer which will be an effective way to evaluate the effectiveness and air cooling effect. In this paper, we have to compare the effectiveness and air cooling effect in two seasons i.e. winter and summer by using parallel flow heat exchanger.

This project helped us to know the step by step completion of a project work. It has been a great experience while completing our project we come across the lot of problems and practical issues. And after solving the all complications we got practical knowledge as well as experience. We had an opportunity to learn how project are been done. We received a lot of practical experience while working on this project as well as got enough freedom to our ideas for the improvement in our assigned project and check whether ideas are fruitful. Therefore, the design must be as perfect as possible and special attention is given during each manufacturing activity.

3. Air-Conditioning through Suspension System by Sandesh Panmand, Derrick Reed, Naseem Khan, Swetank Dubey, K. K. Kshirsagar.

In this paper, coming up with a Suspension operated AC system in automobile cars. This concept comes out as potency of vehicle reduces thanks to mechanical device. Once implementing this concept, the potency of car can increase by reducing compressor specification. The main idea is that the air conditioning result can get on the idea of suspension system in vehicle. As a team, we have a tendency to design the suspension operated AC system. This technique runs on the suspension of

vehicle and can create the air is compress that store in receiver. We have a tendency to begin to the project by 1st making an attempt to come back up with an original plan to suit the matter. Once developing with a plan, to extend the potency of car. We have a tendency to follow the various style methods to finalize our project. Vehicle air-conditioning will considerably impact fuel economy and tailpipe emissions of typical and hybrid electrical vehicles (HEV) and scale back electrical vehicle (EV) vary. For this project the conversion of the force energy in to air. The management mechanism carries the air cylinder (vehicle suspensor), quick valve, Non-return valve and spring arrangement. We've got mentioned the varied applications and further extension additionally. The initial price of this arrangement is high. The standard vehicle suspension dissipates the mechanical energy i.e. potential and kinetic energy. In spring mechanical energy is keep and K.E. is wasted. The aim of paper is that this wasted energy is compressed by mistreatment single acting cylinder by correct arrangement. The main aim of this paper is that the compressed air production mistreatment vehicle suspension is given to the air conditioning system. The pushing power is born-again into compressed air energy by correct arrangement

In this paper, coming up with a Suspension operated AC system in automobile cars. This concept comes out as potency of vehicle reduces thanks to mechanical device. Once implementing this idea the potency of car can increase by reducing compressor specification. The most idea is that the air-conditioning result can get on the idea of suspension system in vehicle. As a team, we have a tendency to design the suspension operated AC system.

4. Compressed Air Production using Vehicle Suspension by S. Vigneswari, V. Vinodhini.

In this project we have a tendency to square measure grouping air cylinder and store this energy to the mechanical device tank as non-conventional method by merely driving the vehicle. Non-conventional energy system is extremely essential at this point to our nation. Compressed air production exploitation vehicle jock wants no fuel input power to provide the output of the air. For this project the conversion of the force energy in to air. The management mechanism carries the air cylinder (vehicle suspensor), fast valve, Non-return valve and spring arrangement. We've got mentioned the varied applications and additional extension additionally. The initial price of this arrangement is high. Man has required associated used energy at an increasing rate for his sustenance and well-being ever since he came on the planet a few million years ago. Primitive man needed energy primarily within the type of food. He derived this by feeding plants or animals, which he afraid. Later on he discovered fireplace and his energy wants exaggerated as he started. To form use of wood and different bio mass to supply the energy wants for change of state similarly as for keeping himself warm. With the passage of your time, man began to cultivate land for agriculture. With additional demand for energy, man began to use the wind for sailing ships and for driving windmills, and therefore the force of falling water to show water wheels. Till this point, it might not be wrong to mention that the sun was supply all the energy wants of man either directly or indirectly and that man was exploitation solely renewable sources of energy. This project is created with pre coming up with, that it provides flexibility operative.

This innovation has created the additional fascinating and economical. This project "Compressed Air Production Using Vehicle Suspension" is meant with the hope that it's pretty much economical and facilitate full to any or all vehicles to provide the compressed gas. This project helped U.S. to understand the periodic steps in finishing a project work. Thus, we've got completed the project with success.

5. Air-Conditioner using Peltier Modules by Shaikh Sohail Mohiyodin, Mubashir Ahmad, Mohd Zahid Abbas, Khan Saif Javed Hasan.

The present air-conditioning system produces cooling result by refrigerants like Freon, Ammonia, etc. Using these refrigerants will get most output however one among the foremost disadvantages is harmful gas emission and global warming. These problem may be overcome by exploitation electricity modules (Peltier effect) air-conditioner and there by protective the atmosphere. This paper deals with the study of electricity cooling exploitation completely different modules area unit mentioned. Electricity cooling systems have benefits over standard cooling devices, such as compact in size, light-weight in weight, high dependableness, no mechanical moving elements and no operating fluid.

The literature relating to the investigation of thermoelectric cooling exploitation completely different modules has been completely reviewed. From the review of the pertinent literature bestowed on top of, it may be inferred that thermoelectric technology exploitation completely different modules used for cooling in addition as heating application has considerable attention. Several researchers try and improve the COP (coefficient of performance) of the electricity air-conditioner using completely different material. Electricity coolers to be sensible and competitive with a lot of ancient forms of technology, the electricity devices should reach a comparable level of potency at changing between thermal and electrical energy.

3. Problem Statement

When the suspension of a vehicle comes into work some K.E. is generated. This K.E. is often wasted as there's no system which might create use of this energy. So, for correct and effective utilization of suspension to not have an effect on the fuel economy of vehicles and to scale back the venturous emissions of air conditioning system we tend to introduce Air Conditioning through Vehicle Suspension.

4. Objectives

1. To design the system which can compress the air with the

help of vibrations generating due to the waviness of the vehicle.
2. To obtain 19 to 22-degree Celsius temperature in the cabinet for the human comfort.
3. To save fuel this is burn for working of Air conditioning system.
4. To reduce the emission of hazardous gases like Nitrogen oxide, carbon monoxide, Hydro carbon.

5. Design of Model

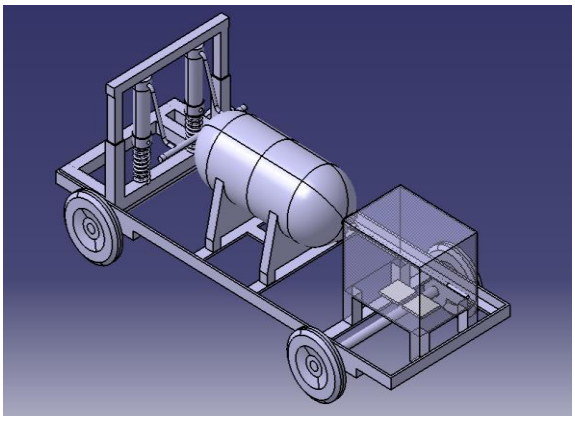


Fig. 1. CATIA Model

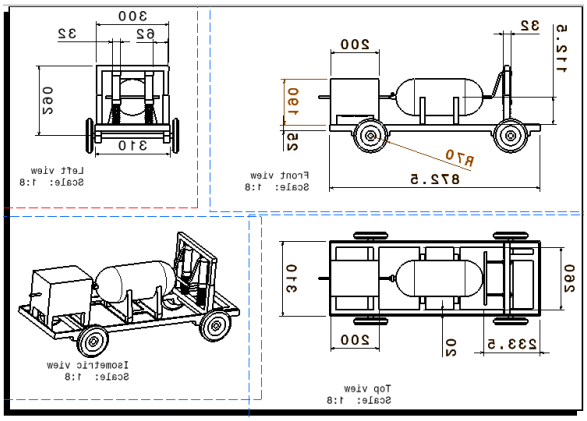
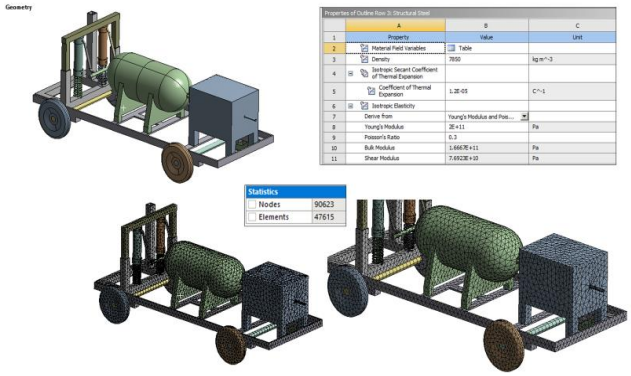
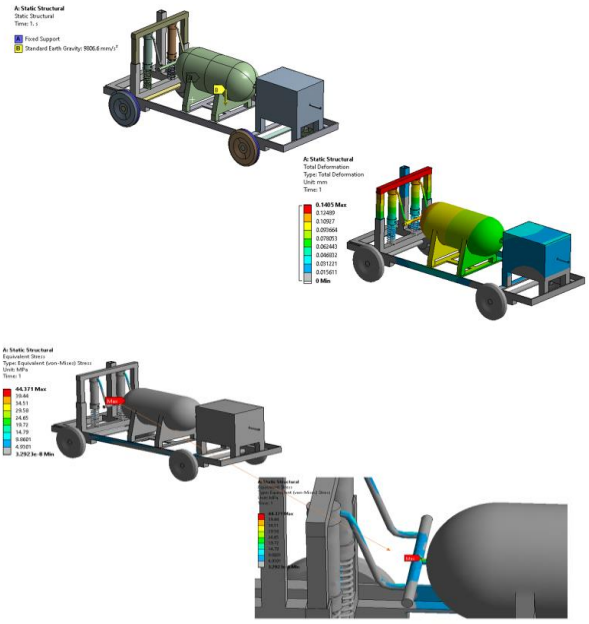


Fig. 2. Drafting of the model

A. *Static structural analysis of model*





6. Working of the System

The design of system is made in such a manner so that when the vehicle comes under the influence of waviness of the road, the piston inside the cylinder moves forward and makes the air to be compressed. This compressed air will be stored into the storing tank (Vessel). Then when we get a desired amount of air with required pressure this compressed air will be moved over the Peltier modules. The Peltier modules works on the principle of Peltier effect where when we supply the electric current to it one of its side becomes hot and another becomes cold. Here as we are cooling the air the cold side is made to come in contact with the air. The air present on the pressure vessel will be allowed to pass over the Peltier modules so that its temperature will get reduced. Finally, at the other end of system we will get the cold air just by giving a small amount of current to Peltier modules.

1. Amount of air compressed in one stroke: The force which is acting on the damping system is 100 N**.** Now for 25 mm diameter and 75 mm stroke length of the standard cylinder. The pressure generated will be 0.20 N/mm2 and 0.0368 m3 amount of air gets compressed in one stroke of the cylinder.

2. Heat transfer: In our design temperature is reduced due to the conduction as air is allowed to come in to the tank where Peltier modules are present. When we supply current to the Peltier module one of its side gets cooled due to Peltier effect

Heat absorbed rate by Peltier module= Q/t=KA(T2-T1)/D

For two Peltier modules=0.0650 J/s

So, after 60 seconds the heat absorbed is Q=3.9 Watts.

7. Advantages and Disadvantages of the System

Advantages:

- Air is out there freed from price.
- No External supply is required.

- Low Cost.
- No pollution & less Noise system.
- Easy construction & terribly compact.
- Low Maintenances.
- Air production is just running the vehicle.

No need of fuel input and electric power input.

Disadvantages:

- Leakage problems.
- Clogging May occurs.
- System may affect by Thermal stresses.
- Due to working burring of material occurs.
- Initial cost of this arrangement is high.

8. Conclusion

In this paper, we've designed a Suspension operated Air Conditioning System for vehicles. This idea comes out as potency of vehicle reduces as a result of utilization of engine power, to run the mechanical device (compressor) for air cooling. When implementing this idea, the efficiency of vehicle can increase by reducing mechanical device (compressor) specification. The most conception is that the air conditioning impact can get on the idea of suspension within the vehicle. . As a team, we designed the suspension operated AC system. This method runs on the suspension of the vehicle and can store the compressed air by using piston cylinder within the receiver tank. Then this air gets cooled because of Peltier impact using Peltier module. Because of this experiment we have a tendency to get a refrigeration impact that lay aside to forty of power that is utilize for air conditioning. So, this helps in increasing the general efficiency of vehicles.

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